

the SPADE GROUP

SPADE is a computer systems support group responsible for systems software on the Sigma 7 programming support for the ARPA project, and a variety of miscellaneous projects of interest to faculty or staff.

SPADE is composed of graduate students, undergraduate students and non-academic staff. Faculty are rarely interested in being part of the group, but are invited to participate as they desire.

Goals

The two fundamental reasons for maintaining a formal group are

- a) to maximize the quality and quantity of significant computer science research and development in the computer sciences department, and
- b) to provide a mechanism for reviewing the group with new students.

Organization and Operation

SPADE operates on a mildly hierarchical basis with two levels. Senior members are responsible for initiation, design, supervision and completion of projects. Senior members in conjunction with the faculty, are also responsible for administrative policy. Members are generally less experienced and work under various degrees of supervision on a variety of projects. In keeping with the second goal expressed above it is hoped that members become senior members.

Projects

Work within SPADE is organized into projects, and projects fall into one of four categories:

Administrative (I)

A number of detailed administrative tasks are necessary to support other work. Our experience has been that these matters must be taken care of by technical staff in order to be done meaningfully. Typical administrative affairs are personnel, documentation, and machine operations.

Short Term projects in progress (II)

These are the most visible efforts of the group. Most of the design work is complete and implementation and/or checkout are in progress.

Short Term projects in suspense III

There are projects for which design work is fairly complete and which work is not progressing on for lack of manpower or other requisites.

Long Term projects (IV)

These are projects in the planning and design stage. Typically an unreasonable number of projects will exist in this stage and many of them will not be completed. At any given time, however, the list of these projects represents the goals and plans of the group.

Personnel

At the time of this writing, Vint Cerf, Charles Kline, Jon Postel, and Steve Crocker are senior members. Doug Landauer, Tony Gomez, Mike Elie, Dave Karas and John Wong are members.

Documents

In addition to the GORDO notebook, user's manual, or other material two sequences of documents are hereby created: SPADE Administration notes, SPADE Design Notes. SPADE Administrative Notes replace GORDO notes.

List of Projects

I Administrative

A. Hardware extensions

A policy needs to be formulated on hardware extensions to the Sigma-7. Funding is intimately involved here. Possible extensions are extra memory, programmable address stop, and more external storage. When such a policy is determined, this topic moves into category IV

B. Working Facilities

Improvement in office space, phone service and secretarial services seems possible.

C. GORDO Notebook - Continued editing and updating.

D. Personnel Management - Keeping people interested in their tasks. Re-allocation assigning new projects. Hiring new people etc.

E. Network Operation - Having people available to field call

from SRI etc. Knowing how to Start Imp etc.

F. LRL Interface

There is a continuing need to clarify our relationship with LRL, to make short and long term plans, and respond to various communications.

II Short Term Projects in progress

A. Real Network Process

The bulk of this process has been programmed but is not checked out. It interfaces with an IMP handler which is checked out and running under GORDO. Documentation for the program is in draft form to be published as a GORDO note within a week.

B. Botch - Process to Run Background Programs Nearing completion.

C. Meta5 - This processor is being interfaced with Botch. Meta5 uses Serial for I/O. Debugging underway. Later Meta5 will need serious revision to run efficiently in GORDO.

D. Test Network Process

A useful tool for testing network software both at the HOST and IMP level is to be able to send and receive an arbitrary bit string.

E. GORDO maintenance

Fixing of bugs; adding mods sent from LRL; cleaning up code.

III Short Term Projects in suspense

A. Experience with the SRI system.

SRI is about to be connected to the network, and in addition, we are getting a TTY and a dataset. It is appropriate to play with the SRI system in preparation for serious interaction.

B. Immediate Consoles

We have, or will have, the following consoles connected to GORDO. (*=connected)

a. Graphics station keyboard/display*

b. Half-duplex SDS TTY*

c. INVAC selectric typewriter (to be connected via COC-DIO**)

d. KSR-33 (for use with SRI over data set. Later to be connected via COC-DIO in November when datasets for Sigma 7 (OC arrive.)

e) two KSR-37's to be connected in November via COC-DIO

Provision should be made for up to 16 consoles, 4-6 of which should have access via data sets to the COC-DIO

**COC-DIO=7611 Character Oriented Communications Interface.

C. Support of Measurements on the Network

Most measurement software has already been provided by BBN in their IMP program. The network process will detect measurement packets from the network and pass them on to user level measurement collection and analysis programs. SPADE group will probably want to get more specifications from people interested in measurement work.

Very little has been done about providing network simulations on the Sigma-7.

D. Fortran IV Compiler and Run Time Package

We have the compiler available under GORDO, but the math library and run-time packages have not been supplied by LRL. We have a new run-time library and are modifying it to support unformatted input. Better error handling in case of format and data mismatch is also being provided. Modification to BF:PIN (program initialization) is necessary before we can run FORTRAN programs under GORDO.

E Users Manual -- Used Documentation of System and Processors needed for UCLA and Network users.

IV. Long Term Projects

A. LISP

We need to acquire or write a LISP system.

B. Assembler - Debugger-Loader-Editor

The next stage of system development is to provide tools appropriate for machine level programming in a time-sharing environment.

C. Automatic Theorem Proving and Semantics Literature Research

This project involves the acquisition of current literature and the formation of a library to support the next two efforts.

D. Toy Theorem Provers and Proof-Checkers

In conjunction with the literature research and in support of future work, we should experiment with theorem massaging mechanisms.

E. Semantic Descriptions

We will attempt to define a language for describing machines and

programs and for describing the relationships among the definitions.

F. Function keyboard

The upper keyboard of the graphics station keyboard is now treated distinctly from the lower (alphabetic) keyboard. Via subroutine calls in the graphics support package, one can assign function keys to various actions that can be supplied by the support package (e.g. display of a particular picture). At some point in the development, we will want to make this keyboard available to RAND tablet users.

G. General Character recognizer

This project is being pursued under the RAD-75 monitor, and uses techniques derived from G. Groner at RAND, and W. Teitelman at MIT (?) Lincoln Labs? The essential important of the work is that

- a. it is being integrated with the standard graphics support package.
- b. allows arbitrary strokes to be classified and associated with functionkeys, or specific actions to be performed by the system.

We are looking forward to allowing DCDL workers to manipulate their logic designs via the display and tablet stylus.

H. User level Software

User level software is distinguished from system (resident or (non-resident) software in that user level software is

- a. used to make system-user interface as convenient to cross as possible, or provide standard, computation services,
- b. Cannot cause the system to crash, or disturb other users except by consent. (e.g. shared pages)

Candidates for user level software includes

- a. assemblers/compilers
- b. network service routines (for establishing, breaking, transmitting over connections).
- c. Graphics station support programs (including function keyboard and Rand tablet)

I. Scheduler Studies and Modifications

A queueing model of the GORDO scheduler is to be constructed and estimates of performance computed. We are interested in measuring various waiting time distributions to compare with the predicted results and to gain insight into any built-in system delays. A CSS simulation model of GORDO is a distinct possibility and should be looked into. Such a simulation will help us decide whether we need to augment CSS for serious modelling studies.

J. Tree-meta -

Design and implementation of TREE-META on the Sigma 7. SRI and UTAY are to be contacted and used in design and implementation for speed and compatability

K. APL

Iverson's language. Montana State has APL running on a stand alone system on their Sigma7, and are willing to give it away. We need to know their design and make necessary changes.

L. Four Shaft Problem

Our particular hardware configuration provides the non-trivial problem of controlling four unsynchronized disks efficiently with one controller. Also involved are some decisions about allocating storage to files within GORDO

M. Graphics Station Software

GORDO's design needs some slight extension to permit efficient but safe operation of the graphics station qua graphics station. The current system only provides for teletype use of the graphics station.

N. Tape

Some specification work has been done for a tape handler under GORDO. Major problems about our view of tape files as opposed to Disk files need to be resolved. The essential difficulty lies with long tape files and small amounts of disk storage.

O. PEEK

This is a debug level program which will allow GORDO users to examine the status of the system. It is similar to SPY and other measurement type programs. Such things as I/O queues, memory allocation, and user status will probably be displayed.

P. Consoles

We note the need to develop powerful programming aids in our research and would like versatile consoles to support this work. Simple character displays such as CCI and Datapoint seem weak in spite of their possible speed. Consoles with light pens, keyboards, joy sticks and the like should be investigated as candidates for expanded facilities. Remote users on the network have many such facilities available and will want to use them if possible under GORDO.